

## Grading Lead in Schools

### New Test Shows Safety

In this month's issue, investigators Charles V. Shorten and Marijane K. Hooven of West Chester University in Pennsylvania report on a method that may give a more realistic measure of the exposure of preschool children to lead-contaminated dust [*EHP* 108:663–666].

Shorten and Hooven set out to assess the relationship between 168 preschool children attending Philadelphia Head Start programs and various methods used to determine their exposure to lead in their classrooms. The scientists chose these young children because they are most susceptible to the deleterious effects of lead poisoning; in addition, their hand-to-mouth activities can lead to ingestion of lead-contaminated dust, and they spend up to eight hours per day in the classrooms. Ten classrooms in five buildings, each with a confirmed presence of lead-based paint, were included in the assessment. The scientists sought to determine whether the children were at significant risk of lead exposure by their presence in rooms likely to contain lead-contaminated dust.



**Defining the danger of dust.** New research indicates that even though lead-contaminated dust may be present in classrooms, kids aren't necessarily exposed to dangerous levels of the metal unless they can reach it.

To do so, they went a step farther in their wipe sampling protocols than previous studies had—they analyzed wipe samples from the children's palms and from both accessible and inaccessible surfaces within the rooms. Previous studies had not made this crucial differentiation between accessible surfaces such as desktops, windowsills, and doorknobs, and inaccessible surfaces such as the tops of filing cabinets and light fixtures. While high concentrations of lead were found in the dust on the inaccessible surfaces, the concentrations on the children's palms and the accessible surfaces, which are cleaned daily, were uniformly low. Determinations of the children's blood lead concentrations taken before enrollment in Head Start and after six months of exposure to the study settings confirmed the sampling data—156 children experienced no change in blood lead concentration, while 12 experienced only a minimal increase.

The authors conclude that current cleaning methods are effective at preventing lead-contaminated dust exposure within these classrooms, and the higher concentrations of lead in the dust on the inaccessible areas does not automatically constitute a health hazard because there may not be a completed exposure pathway. Prior studies, which the researchers say assessed only the presence of lead-contaminated dust, assumed that children were necessarily exposed simply because lead was present in the rooms. Shorten and Hooven limit their conclusion to the assertion that "there is no completed exposure pathway for lead from the most contaminated surfaces to the children in these schools." —Ernie Hood

## Arsenic Again

### A Continuing Threat in Chile

Arsenic poisoning is serious business. Chronic exposure to high doses of the element in drinking water increases the risk of vascular diseases and skin, lung, and bladder cancers, and may be associated with diabetes mellitus. In addition, although less attention has been accorded to the effect of arsenic on reproduction, teratology in animals is well documented. In this month's issue, Claudia Hopenhayn-Rich of the University of Kentucky in Lexington and colleagues present findings concerning reproductive effects of arsenic in drinking water in two areas of Chile, and Allan H. Smith of the University of California at Berkeley and colleagues present findings concerning arsenic-induced skin lesions in a study of indigenous people who have resided in northern Chile for many centuries [*EHP* 108:667–673; 617–620].

Hopenhayn-Rich's study compared infant mortality rates in two areas of Chile, Antofagasta (north) and Valparaíso (central). Antofagasta experienced a 12-year period of substantially high arsenic concentration in its drinking water starting in 1958, when the city incorporated the Toconce River as its main drinking water source. The geologic, natural sources of the element in the river drove drinking water arsenic concentrations to as high as 860 micrograms per liter ( $\mu\text{g/L}$ ). This was largely remedied with the 1970 installation of an arsenic removal plant; today, the concentration is around 50  $\mu\text{g/L}$ . Valparaíso, on the other hand, does not have any recorded history of elevated arsenic in drinking water.

The authors used several statistical methods to examine the effects of time and location on the infant mortality trends observed between 1950 and 1996. The data indicate general declines in late fetal and infant mortality in both Antofagasta and Valparaíso over time, probably because of other nonarsenic-related factors such as improvements in health care and standard of living that affected all the regions in Chile. However, the data also show elevations in late fetal, neonatal, and postneonatal mortality rates for Antofagasta compared with Valparaíso for a defined period of time reflecting the rather sudden and sharp rise in the concentration of arsenic in the city's public water supply.

Hopenhayn-Rich and colleagues point out that although there is suggestive evidence for the developmental effects of arsenic, a clear causal association cannot yet be established, although their findings of increased late fetal, neonatal, and postneonatal mortality rates lend further support to previous studies. The authors stress the need for further studies using individual-level data, well-designed methods of exposure assessment, and collection of data on potential confounders to examine a broad range of reproductive and developmental end points.

Smith's study focused on the village in Chiu Chiu in northern Chile, where the native Atacameño people, who have inhabited this extremely arid region for more than 9,000 years, drink water from rivers originating in the Andes Mountains. Many of these rivers contain high concentrations of inorganic arsenic; concentrations of arsenic in the drinking water can reach as high as 800  $\mu\text{g/L}$ . Despite this fact, some earlier reports had suggested that the Atacameño were less affected by arsenic than other exposed populations, giving rise to the theory that centuries of exposure had built up their resistance to the effects of arsenic, including characteristic skin effects such as dark brown spots, darkening of skin on the limbs and trunk, and keratoses on the palms of the hands and soles of the feet.

The scientists selected 11 families of Chiu Chiu likely to have the greatest exposure to arsenic, as determined by factors including age of family members, how long they had lived in the area,